demand for intrastate toll service, consumer demands for new types of telecommunications technologies, marginal costs of local service, costs and benefits of different types of local services, including the effect of higher access fees on consumer welfare, demand and prices in the cellular telephone industry, and consumer demands for new types of pricing options for long distance service. I have also studied the effect of new entry on competition in paging markets, telecommunications equipment markets, and interexchange markets and have published a number of papers in academic journals and books about telecommunications. I have also edited two recent books on telecommunications, Future Competition in Telecommunications (Harvard Business School Press, 1989) and Globalization, Technology and Competition in Telecommunications (Harvard Business School Press, 1993).

4. I have provided testimony regarding cellular telephone previously to both federal and state regulators. I submitted affidavits to the FCC with respect to competition in the cellular industry in 1988 and 1989. In 1992 and 1993 I submitted testimony to the FCC regarding the forthcoming Personal Communications Services (PCS). On April 11, 1994 I spoke at the FCC open meeting on issues in PCS regulation. I have also testified before state regulatory commissions regarding the proper scope of regulation of cellular telephone service.

I. Conclusions and Recommendations

5. I have been asked by Airtouch Communications to consider the question of CMRS Spectrum Aggregation Caps which arose in the Further Notice of Proposed Rule Making (FNPRM) in GN Docket 93-252. The FCC's concern is that CMRS licensees which acquire large amounts of spectrum in a given area could exert "excessive market power" that would adversely affect competition both with specific CMRS service categories and in CMRS generally. The FCC

tentatively concludes that a 40 MHz spectrum cap provides a reasonable basis for calculating a general CMRS spectrum cap. I conclude that the proposed spectrum cap is not a good idea because it is likely to harm consumers. It will penalize low cost efficient providers of wireless service and also harm providers of innovative wireless service.

II. Wireless Communications are Evolving in an Extremely Dynamic Manner

6. Wireless telecommunications service has been evolving over the past 10 years in an extremely dynamic manner. Cellular customers have grown at 35-40% per year up to the current level which exceeds 16 million customers. This amount of customers far exceeds the AT&T prediction of a decade ago of about 1 million cellular customers by the year 2000! Other services, such as paging, have also grown at rates of between 10-20% per year. These sustained growth rates are well beyond almost any other U.S. industry.

7. Technological change has also been dramatic in mobile telecommunications. Analog cellular CPE has shrunk in size, increased in technological capability, and decreased in price so that over 50% of cellular units are now portables. Cellular operators have now begun to convert their analog systems to digital radio technology, either TDMA, which will offer a 3 times increase in capacity over analog, or to CDMA, which will offer a 5-10 times increase over analog. Cellular operators have also employed technology such as sectorization, overlay/underlay cell sites, cell enhancers, downtilted antennae, and dynamic cell power controllers. Cell-size reduction technologies (microcells) have also been developed and deployed to increase cellular capacity.

8. SMR which has been used to provide analog trunked dispatch service along with limited interconnect service has begun to evolve into ESMR. ESMR uses a digital radio technology based on TDMA. The MIRS technology, developed by Motorola, allows a 6 times increase in capacity over analog cellular and about a 15 times increase in capacity over current SMR. ESMR provides a directly competitive service to cellular. ESMR offers a combined voice, dispatch, and paging service for its customers. Nextel has begun operation of its ESMR in Los Angeles and DialCall and Onecomm plan to begin their ESMR service this year.

9. PCS auction will begin this year. The FCC plans to auction 6 broadband PCS spectrum blocks in each geographical area. Thus, at least 4 new providers of mobile telecommunications should begin service within the next few years.[1] PCS already works. In December 1993 when I visited the United Kingdom (UK), I used the PCS network which has been constructed by Mercury in partnership with U.S. West.[2] The new PCS network in the UK has been so successful that Mercury has been forced to curtail advertising until its suppliers can catch up with the demand for the mobile telephones.[3] In April 1994, a second PCS operator, Hutchison, began operation in the U.K. PCS operates in the 1800 MHz band in the U.K. which is approximately the same frequency band that much of PCS is scheduled for in the U.S.[4] Since PCS began operation in the UK during 1993, cellular prices in the UK have decreased by about 20-33%. Thus, PCS will provide increased competition to cellular.

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[1] Two of the 6 new PCS spectrum blocks can be purchased by current in-region cellular providers.

[2] Mobile Telecommunications, No. 136, Nov. 4, 1993, reports that about 33%-50% of new mobile telecommunications hookups in the UK have been on the Mercury PCS network. Furthermore, cellular service prices have fallen by about 1/3 since PCS was introduced in the UK.

[3] See Mobile Telecommunications, No. 136, November 4, 1993, p. 1.

[4] The frequencies are not exactly the same. However, the frequencies are close enough so that no difference in operation is expected.

10. Numerous other services are likely to be offered in addition to mobile voice services. Data services, advanced paging systems, and advanced dispatch systems are all expected to be offered. Indeed, the FCC has stated it seeks to promote flexibility and diversity in mobile services. (para. 87)

III. Different CMRS Services are in Different Markets and are Likely to Remain in Different Markets in the Future

11. The FCC is concerned that if licensees acquire large amounts of CMRS spectrum in a given area they could acquire "excessive market power by potentially reducing the numbers of competing providers...". (para. 89) However, as the FCC realizes it must first define the relevant product market for CMRS services in order to do a competitive analysis (para. 90). It is not currently the situation that all CMRS are in the same relevant product market. Further market differences are even more likely in the future because of the dynamic evolution of the technology.

12. Economists and the antitrust law defines the relevant market to be the products (or services) which compete with each other in a significant manner. The 1992 DOJ and FTC Horizontal Merger Guidelines (1992 MG) operationalizes market definition using the "5% test":

> "A market is defined as a product or group of products and a geographic area in which it is produced or sold such that a hypothetical profit-maximizing firm, not subject to price regulation, that was the only present and future producer or seller of those products in that area likely would impose at least a "small but significant and nontransitory" increase in price, assuming the terms of sale of all other products are held constant." (Para. 1.0)

The "small but significant and nontransitory increase in price" is usually taken as 5%. The question being asked is does one service, e.g. paging, constrain the price of a hypothetical monopolist in another service, e.g. cellular. If so they are in the same product market.

13. Using the traditional tools of market definition, it is clear that cellular and paging are in different product markets. If both cellular carriers were controlled by a monopolist and raised their prices by 5%, not enough customers would shift to paging to make the price increase unprofitable. Similarly, if all paging providers in a given area raised their prices by 5%, not enough customers would switch to cellular to defeat the price increase. Using similar reasoning, traditional dispatch services do not constrain the price of cellular. In the future other CMRS services are unlikely to be in the same product market. Data services are unlikely to constrain the price of mobile voice services, and paging is likely to continue to be in its own product market. Thus, based on current service offerings and future service offerings, many CMRS services will be in separate markets. No economic basis exists to place them into the same product market.[5]

14. The FNPRM also discussed the question of whether even though individual CMRS services are not in the same market a "sub-market" might be used to justify an overall spectrum cap. (para. 91) "Sub-markets" are a discredited tool of antitrust analysis. They are merely an invitation to sloppy analysis. Market definition provides the appropriate conceptual tool in which to consider competition while a sub-market properly defined, correctly defined, turns out to be a market. Indeed, neither the 1982, the 1984, nor the 1992 revisions of the Merger Guidelines even use the term sub-markets.

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[5] Supply side substitution also does not provide a basis for putting services in the same market. For instance, the approximate 1.7 MHz of paging spectrum is not sufficient to provide a competitive voice mobile service, even if the spectrum were permitted to be used for this purpose.

15. Overall, the amount of spectrum to be allocated for CMRS will be about 200 MHz: 50 MHz for cellular, 19 MHz for ESMR (both 800 MHz and 900 MHz systems) and 120 MHz for broadband PCS, 2 MHz for narrowband PCS, and 17 additional MHz for common carrier paging, IMTS and other Part 90 services. With 2 cellular providers, 1 ESMR provider, and 4-6 PCS providers, market competition provides a superior means to "protect" consumers. Regulatory restrictions on expansion of services by providers will generally lead to consumer harm. In an extremely dynamic industry such as CMRS, the FCC should only impose constraints if it can conclude definitely that such constraints will help consumers. In an industry with extremely dynamic technological change, neither the FCC, nor any expert body, can predict the future with sufficient precision to be confident that future developments will not cause constraints adopted today to lead to lower consumer welfare in the future.

IV. Unilateral Exercise of Market Power is Unlikely to Occur in CMRS

16. The FNPRM's stated concern is that if a licensee is able to acquire a large amount of spectrum relative to its competitors, "foreclosure" of opportunities of competitors may occur. The FCC here seems to be too concerned with the number of competitors rather than the amount of competition which is the ultimate determinant of consumer welfare. Economic analysis demonstrates why competition may not be helped, and may well be decreased, by the current spectrum caps.

17. The usual method for a firm to exercise market power is by raising its price by restricting it supply of output. However, this attempted restriction in supply can only work if consumers do not substitute other goods or other firms are unable to profitably increase their supply. Thus, both demand elasticities and supply elasticities are relevant in the analysis. The 1992 MG analyzes the ability of a firm to decrease competition by restricting

supply under the section of "Unilateral Effects". However, the 1992 MG do not find that a (merging) firm falls outside the safe harbor until it has at least 35% share of the market. (paras. 2.211-2.22) On a spectrum basis note that the proposed cap of 40 MHz is only 20% of the CMRS spectrum while a cap of 50 MHz still rises to only 25%.[6] Both of these levels are far below the 1992 MG standards.

18. Economic analysis demonstrates that the unilateral exercise of market power is even more unlikely in CMRS than in the usual market situation. Economic theory explains that given the cost of production the price for a product depends inversely on the demand and supply elasticities. Thus, the higher the market demand elasticity and the higher the supply elasticity of competing firms, the more competitive will be the outcome. A high supply elasticity means that a small price increase will lead to a large increase in the output of a firm's competitors either through expansion of output or new entry into the market. The supply elasticity in CMRS is likely to be especially high given the large fixed costs and small marginal costs which characterize CMRS markets. Towers, radios, and switches are all large fixed costs which do not vary with a small (marginal) increase in output. Thus, competitive firms will be able to profitably increase their supply if a given firm attempts to limit its output. Given the technology and high supply elasticities in CMRS, the ability of a firm to exercise unilateral market power in the CMRS industry is quite limited. Indeed, the unilateral exercise of market power seems less likely in CMRS, holding other economic factors equal, than in the "typical" industry which has higher relative marginal costs and lower supply elasticities.

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[6] While both cellular carriers have a total of 50 MHz of spectrum, under a MG analysis they would not currently be allowed to combine because they are currently each other's closest substitute product. In the future, after construction of ESMR and PCS networks, this situation might well change.

19. Supply elasticities are likely to increase in the near future. I discussed above the transformation of CMRS technology from analog technology to digital technology. This transformation is already occurring in cellular and SMR/ESMR. The much greater capacity of digital, compared to analog technology, will lead to increased supply elasticities. The increased supply elasticities arise because the greater radio capacity decreases the need to split cells when additional output occurs. Splitting cells causes a significant marginal (incremental) cost when demand increases. However, the reduced requirement to split cells will decrease substantially this component of incremental cost. Thus, two economic factors will lead to high supply elasticities: (1) the substantial fixed costs which cause price to be greater than marginal cost in a competitive CMRS industry and (2) increases in capacity and the supply elasticity when CMRS providers shift to digital technology.

20. The other concern expressed in the FNPRM is the possibility of "foreclosure". Anti-competitive foreclosure can occur if sufficient barriers to entry exist such that competitive firms find it uneconomical to enter the market. However, market evidence already demonstrates that foreclosure will not occur in CMRS markets. Note that ESMR companies such as Nextel, DialCall, and OneComm have already entered the market and begun to construct their networks although the maximum amount of 800 MHz ESMR spectrum is 14 MHz. Similarly, interest among potential PCS entrants is also quite high as the numerous proceedings before the FCC have demonstrated. Thus, market entry has already occurred and will increase in the future. Given market entry and low marginal (incremental) costs found in CMRS, high supply elasticities will exist and the unilateral exercise of market power will not occur.

V. Spectrum Caps May Well Decrease Competition in CMRS

21. Firms are typically successful in an industry because they have either lower costs than their competitors or they produce a superior product (or both). Lower costs lead to lower prices which benefits consumers. Superior products also benefit consumers. Proposed spectrum caps may well lead to higher costs and less innovation in wireless services. The outcome would be anti-competitive and it would harm consumers.

22. Economists and policy analysis widely recognize that significant economies of scope exist in telecommunications.[7] Economies of scope means that a company can provide two telecommunications services at lower cost than two separate firms providing the services. This outcome will be prevalent in CMRS services because towers, transmission lines, and switches can all be shared to decrease costs. However, a spectrum cap may well rule out the ability of a company to use its economies of scope. A successful firm which is providing a CMRS service in one market may be unable to provide a CMRS service in another market because it has already run up against the spectrum cap. Under this type of reasoning, IBM would not be permitted to manufacture mainframe computers, mini-computers, and PCs, because the sum of its output would be "too large". Significant economies of scope exist in manufacturing computers because of common R&D and fabrication plants.

23. The inability to use economies of scope has two undesirable consequences. First it leads to a decrease in economic efficiency. As my colleague Professor Paul Samuelson explains in his classic introductory textbook:

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[7] See e.g. David P. Reed, "Putting It All Together: The Cost Structure of Personal Communications Services" (OPP Working Paper No. 28, November 1992) for an analysis of economies of scope for certain CMRS services.

> "Efficiency is a central (perhaps the central) concern in economics. Efficiency means there is no waste....[T]he economy is performing efficiently when it cannot produce more of one good without producing less of another." (P.A. Samuelson and W.D. Nordhaus, Economics, (Twelfth Edition, 1985, p. 28)

Decreased economic efficiency means that the U.S. economy is wasting its resources. Second, failure to use economies of scope leads to higher costs. Higher costs leads to higher prices which harms both competition and consumers.

24. Spectrum caps may also lead to reduced innovation. Suppose that a firm invents a proprietary technology which creates tremendous demand, e.g. a low cost mobile interactive TV type service so that Dick Tracy technology does come to pass. The new service might well require more additional spectrum than the company can acquire under the spectrum cap. The firm would be required to license its technology to other firms and would likely receive a reduced return to its invention. Reduced returns to invention reduce the amount of R&D and new products as economic research has demonstrated numerous times.

25. The effect on innovation could be quite large. Suppose that a regulatory body had decreed in 1982 that Intel could not acquire more than 20% of the microprocessor market. Presumably, many more firms would have continued to produce microprocessors, but Intel's incentive to do the massive amounts of R&D they have done would have been substantially less. Users of PCs who have benefitted from the evolution of the I286, to the I386, to the I486, to the Pentium would have been made much worse off.

26. The U.S. economy has operated, in large part, by letting successful firms expand, so long as they do not use anti-competitive means of expansion.

The FNPRM does not discuss possible anti-competitive concerns that current CMRS market participants could use to disadvantage their competitors.[8] The proposed spectrum caps thus will lead to "handicapping of competitors" by a regulatory agency. Handicapping of competitors is a bad idea for the U.S. economy because even an expert agency cannot foresee the future in a dynamically changing industry such as CMRS.

27. The FCC is beginning a new policy in which market forces will be used to determine the allocation of spectrum via an auction mechanism. The basic idea of market allocation of scarce resources is that those individuals (or firms) who value a good the most will be able to purchase the good. Furthermore, the outcome is economically efficient since no alternative allocation of resources can lead to greater consumer welfare.[9] To quote Samuelson:

> "It means that an omniscient planner could not come along with a computer and find a solution superior to the market outcome....This concept of efficiency--that you cannot make one person better off without making another one worse off--is one of the central ideas of economics". (P.A. Samuelson and W.D. Nordhaus, Economics, 12th ed., 1985, p. 678)

The market allocation framework differs greatly from the traditional FCC decision process in which administrative decisions were used in place of market decisions to allocate scarce spectrum. Thus, the key phrase for the new FCC policy should be to "let the market decide".

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[8] Note that PSTN interconnection rules have been established, and new CMRS entrants will not require use of their competitors' networks to operate.

[9] Of course, this outcome need not hold in the presence of market failures, e.g. externalities. No reason for market failure arises in the market allocation of PCS spectrum.

VI. The FCC Should Proceed on a Case by Case Basis Rather than Attempting to Establish Broad Spectrum Limitations Today

28. The future evolution of the CMRS industry cannot be predicted with sufficient accuracy to establish broad limitations such as the proposed spectrum caps. New services will be offered, new technologies will be introduced, and new consumer lifestyle patterns will change both the supply and demand factors in the CMRS industry greatly over the next decade. If the FCC establishes a broad spectrum cap, it will diminish future competition and establish a regulatory framework in which competitors will attempt to use the regulatory framework to disadvantage their competitors.

29. The FNRPM sees the proposed spectrum caps in part as a prophylactic measure to guard against future developments in CMRS. However, experience with the MFJ demonstrates why predictions of the future are not safe in telecommunications. When the MFJ was signed, most information services were delivered from large central computers to terminals often using special telephone lines. By 1990 PCs had become the most important type of computer and CD-ROM and other technologies did not require special telephone lines to deliver information. Indeed, BOCs could not distinguish computer data from voice traffic on their networks. Nevertheless, almost all major information service providers opposed the change in the MFJ (which the FCC favored) because they did not want to face increased competition. Similarly, in a recent court proceeding in which Kodak successfully had consent decrees from 1921(!) and 1954 removed, all of Kodak's competitors opposed the decree terminations although none of Kodak's customers opposed the change.[10] Not surprising, in the intervening 40 years from the more recent 1954 decree, technology in the film and processing markets had changed dramatically. Yet, competitors will always attempt to use such outdated regulatory constraints to their advantage.

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[10] United States of America v. Eastman Kodak Company, decision by Judge Michael Telesca, Rochester, N.Y., May 20, 1994.

30. A much better approach than a general regulatory constraint is review on a case by case basis by the FCC. The Commission must approve the license transfer from one CMRS provider to another. At that time, it can review the services in question and decide whether the transfer is in the public interest after it carefully considers the competitive and other public interest implications of the transfer. At the time of the transfer the current and future technology are likely to be considerably easier to analyze because substantial technological uncertainty will be resolved with the passage of time. Since the proposed services may well be in different CMRS markets and may be services which do not even exist today, this increase in knowledge is likely to lead to a more reasoned decision by the FCC.[11]

31. Case by case analysis can also take into account the particular features of the services in question. Note that neither the DOJ nor FTC has ever stated that a post-merger market share of say 40% will be prohibited. Instead, the 1992 MG states,

> "However, market share and concentration data provide only the starting point for analyzing the competitive impact of a merger. Before determining whether to challenge a merger, the Agency also will assess the other market factors that pertain to competitive effects, as well as entry, efficiencies and failure." (para. 2.0)

The DOJ and FTC do a case by case analysis for proposed mergers. A similar approach should be used for license transfers in CMRS. For instance, a "merger" of a paging provider and a cellular provider would cause no anticompetitive problems. Thus, broad prohibitions as considered by the FNPRM are an inferior approach to a case specific analysis by the FCC. Given the dynamic technology evolution in the CMRS industry, case specific analysis is

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[11] Furthermore the DOJ and FTC will also be able to review future license transfers for potential anti-competitive effects under the Hart-Scott-Rodino Antitrust Improvement Act of 1976.

even more valuable than in a more technologically stable industry. No "magic share" number exists in any merger analysis as the 1992 MG recognizes since economic factors must be used in the analysis to understand the likely economic effects. Thus, any given level of a spectrum cap is inherently arbitrary. Especially with the dynamic technology in CMRS, a case specific analysis is far better public policy than use of a cap which is likely to decrease competition in the future.

VII. Conclusion

32. The FNPRM's proposed use of spectrum caps is misguided economic and regulatory policy. Many CMRS services are in different markets so combined provision of them will not raise a competitive problem. To the contrary, to the extent that economies of scope exist, combined provision of the services will lead to lower costs and lower prices for consumers. Furthermore, future innovation could well be decreased by spectrum caps. Instead, the FCC should do a case by case analysis in the future when license transfers are proposed. The Commission's understanding of the technology will be much more developed in the future than it is today. The history of general regulatory constraints demonstrates that they are used by competitors in an anti-competitive manner. A case by case analysis will decrease the ability of competitors to engage in such anticompetitive actions.

J. A. Hausman 14 June 1994

Jerry A. Hausman

Subscribed and sworn to before me
this 14th day of June 1994.

Notary Public
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AIRTOUCH COMMUNICATIONS
ATTACHMENT 2

AirTouch Communications Exhibit
in GN Docket No. 93-252

Competitive Implications of Spectrum Caps

by

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